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ON THE PHYSIOLOGICAL

AND

MEDICINAL PROPERTIES OF IODOFORM.

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SINCE the application of chloroform to anæsthetic purposes, every thing relating to it has assumed a popular aspect; and I think the opportunity a good one for calling the attention of the profession to an allied substance of singular constitution, and possessed, if I do not mistake, of singular and valuable properties. In the paper which I published "On the Physiological and Medical Properties of Bromine and its Compounds," and on the analogies between them and chlorine and iodine and their compounds, I called the attention of the profession to this body, iodoform, as I also did to the remarkable physiological properties of the chloride and bromide of olefiant gas, and to those of chloroform, then all (I may say) unknown bodies. My paper was variously and favourably noticed; but that part of it which I considered the most valuable and interesting, and the most novel,—viz. the chapter headed "Physiological Properties of the Bromide and Chloride of Olefiant Gas—of Bromoform, Chloroform, and Iodoform," was *never noticed at all*.

The following is the passage in this paper regarding the medicinal properties of iodoform:—"I have used iodoform with great benefit externally in many obstinate skin affections,—such as lepra, psoriasis, chronic eczema; and internally, with benefit, in a very old case of bronchocele, and in scrofulous enlargements of the glands. I gave it in doses of two grains, thrice a day in pill, with mucilage and bread crumb; externally, in the dose of half a drachm to the ounce of simple cerate. I believe that this may prove one of the most valuable remedies that we have."

In the years 1838-39, I used iodoform extensively in skin diseases in the Newcastle Infirmary, in care of Sir John Fife. I expected at the time, and understood that an account was kept of the cases, and furnished several pounds' worth of iodoform. On applying for the reports of the cases, I was favoured by the house-surgeon with very much such a testimonial as Professor Holloway has the

credit of advertising :—"Dear Sir,—Your ointment has performed such and such wonders." But Sir John Fife will corroborate me when I say, that the results obtained were very surprising. Since then, I have used iodoform from time to time, both in dispensary and private practice; and some druggists have been in the habit of keeping the remedy prepared for my prescriptions. I have also repeatedly urged a trial of it upon the physicians and surgeons of our Infirmary, and upon other medical men, but without being able to get them to use it.

When we consider the constitution of iodoform,  $C_2 H_8 I_3$ ; so that 13 grains of carbon and hydrogen in this body render about 380 grains of iodine, *organic*; change the iodine from an inorganic into an organic body of the same nature as an acid secreted by animals, and possessing relations with alcohol and ether (an assimilable substance), we cannot help being struck with the extraordinary chemical composition of the substance, and become desirous of ascertaining its physiological and (if any) its medicinal properties.

In this paper, I shall first speak of the chemical history of iodoform, state some facts with regard to its mode of preparation, and then on what is known of its physiological and medicinal properties. Iodoform was discovered by Serullas, who named it perhydrioduret of carbon; and Mitscherlich, in examining it, announced the opinion that it contained no hydrogen (*Annales de Chimie et de Physique*, tom. xxxvii. p. 84). Its true nature was demonstrated by Dumas (*Ibid.* tom. lvi. p. 113), who proved that it should be considered as a body analogous to formic acid, where the oxygen is replaced by iodine. Since iodoform was discovered, the mode of its preparation has undergone many changes, and probably remains very imperfect. Serullas first obtained it by the action of potassium on the alloy of antimony, and potassium on the alcoholic tincture of iodine. He then prepared it by the action of chloride of iodine on an alcoholic solution of potass, and he discovered, at last, that it could be obtained with facility by mixing, until discoloration, alcoholic solutions of iodine and potass.

It is certain that the union of iodine and potass in the presence of alcohol, causes the formation of iodoform; but the theory of this formation is still very obscure. Mitscherlich, Bouchardat, and Liebig, have all given different formulas of the reaction. Bouchardat, indeed, in one paper has given two or three (See *Recherches sur l'Iodoform, &c., par A. Bouchardat, Journal de Pharmacie, Janvier 1837*), admitting, at the same time, that they are not in accordance with actual results. According to Liebig, the following would be the reaction :— $C_4 H_5 O + H O + I_8 + 6 K O (C_4 H_6 O_8 I_8 K_6) = C_2 H I_3 + C_2 H O_3 K O + 5 K I + 4 H O (C_4 H_6 O_8 I_8 K_6)$ . But this formula cannot be wholly correct, because formic acid, formic ether, and iodate of potass, are formed in the process. Of course this formula would give 1 atom of alcohol, 8 of iodine, and 6 of potass, equal to, in the decomposition, 1 atom of periodide of for-



myle (iodoform), 1 of formiate of potass, 5 of iodide of potassium, and 4 of water. But if we mix the ingredients in the proportion indicated by Liebig's formula, we shall get hardly any iodoform.

Iodoform, according to my observations, is best prepared by carefully adding an aqueous solution of potass to the simple tincture of iodine of the Edinburgh Pharmacopœia until discoloration is effected. Care must be taken, however, to leave a slight excess of iodine. I find that 252 grains of iodine dissolved in 6 ounces and 3 drachms of rectified spirit, and 127 grains of hydrate of potass in 3 ounces of water, with the addition afterwards of 31 oz. of distilled water, gave 38 grains of iodoform. Such is the statement of a gentleman in this town, who lately performed the experiment for me. Of course, were the substance prepared on the large scale, the alcohol could be recovered by distillation, and the iodine also, either in the elementary state, or as iodide and iodate of potass, mixed with formiate of potass. Iodoform can be prepared with naphtha; but when so prepared, it has not so agreeable an odour as when obtained from alcohol.

Iodoform, insoluble in water, is very soluble in alcohol, ether, and wood spirit. It crystallizes in brilliant yellow plates from the alcoholic solution. It is volatilized at  $212^{\circ}$ , and decomposed at a somewhat higher temperature. Its smell is exceedingly powerful, and to me not disagreeable; although, in houses where I have used it, complaints have been made of the powerful smell of the ointment. The taste is somewhat sweet, but not so agreeable as that of chloroform.

All that we know of its physiological properties, except from its analogy with chloroform (so far as direct experiment goes), is derived from an experiment recorded by Dr Cogswell in his elegant work on iodine (p. 122). He calls it sesquiodide of carbon (after Serullas). The following are the details of this most interesting experiment:—"At eleven o'clock A.M., an active, strongly made, terrier dog, was made to swallow fifty grains of the sesquiodide of carbon, concealed in a loose fold of paper. The day following, the animal was in good spirits, and seemingly quite unaffected, except so far as was indicated by a disregard for nourishment. On the third day he was indisposed to rise, and at length made but feeble efforts to crawl, the heart beating irregularly, and the belly drawn in towards the spine. For the whole of the fourth day the animal lay stretched out on the side, and gave no sign of recognition; the head extended, each respiration accompanied by a hollow moan, and followed by a universal convulsive movement, the mouth closed, eyes open, pupils natural, eyelids winked as usual. Death took place in the night."

He found, on inspection, great rigidity of the muscles, great congestion of the lungs, and marks of irritation, with a blackish appearance in the stomach; all appearances proving the strict analogy in physiological action between this body and chloroform. Appended

is an illustration of the action of chloroform on the stomach of a rabbit, which will show a similar kind of action.<sup>1</sup>

With regard to the medicinal use of iodoform, according to Dr Cogswell, Dr Litchfield had used it with advantage in cases of enlarged glands, and in porrigo and lepra in the form of ointment, composed of half a drachm of the iodoform to six drachms of simple cerate.

I have used the iodoform most extensively in skin diseases, in psoriasis, impetigo, porrigo, and in one or two aggravated cases of itch (*grosse gale*). In all these affections it was very successful. Externally, conjoined with its internal use, in four cases of goitre. In two of the cases of goitre, the enlargements were small and of short continuance; but disappeared rapidly under the influence of iodoform. The dose was three grains thrice a-day in those cases (both young women). The enlargement disappeared in the one case in three weeks; in the other in a fortnight. The ointment of one drachm of iodoform to the ounce of simple cerate being rubbed upon the tumours.

The old case of bronchocele, referred to in my paper on bromine, was a Miss M. of Tanfield, aged thirty-eight, who had had bronchocele for more than seven years. The swelling was as large as a good-sized turnip. She had not menstruated to any proper extent for years; of stout habit of body, but not very regular; tongue tolerably clean. Pulse 100, when the treatment was commenced on the 12th of February 1842. The ointment of the strength above mentioned was applied externally, and two grains in pills given thrice a-day. On the 27th of April the tumour was much reduced. She had menstruated freely, but complained of being much weaker. Had made much more water. Appetite better; pulse 90; tongue clean. The treatment was continued with occasional intermissions until the 11th of June, when the tumour was reduced to the size of a walnut. I saw her about a year after; the tumour was still of the same reduced size.

Another case of goitre was a girl of eighteen; lived at Killingworth, January 31, 1844. Had a goitre for four years. General enlargement of the thyroid, but particularly the left lobe; three inches in one direction, taking the highest point of the left lobe, and about two inches in breadth. The tumour obstructed swallowing, and produced nausea after eating. She was also subject to headaches. Menstruated regularly. Pulse 120; tongue clean; bowels regular. She had 3 grs. of iodoform thrice a-day, and the ointment externally. On the 14th of next month the tumour was decidedly smaller, and her general appearance greatly improved. The treatment was continued until September, with occasional omissions. The goitre might

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<sup>1</sup> The blood, brain, spinal cord, muscles, etc., were impregnated with iodine. I have elsewhere noticed the singular power of permeating the tissues which chloroform possesses.



then be said to be gone. All the functions were regular; the pulse normal, and her strength was greatly improved. The principal physiological effect noticed during the administration of the iodoform, was a great increase of the urine. My friend Mr Potter saw this case, and was desirous at the time that I should again call the attention of the profession to iodoform.

In conclusion, these remarks are offered, of course, chiefly as suggestions. That so remarkable a substance possesses medicinal powers of no ordinary character is pretty certain. I hope that some one who has extensive opportunities of trying it in practice, will avail himself of it. It appears to me to possess a union of tonic, stimulant, and alterative properties, which perhaps no other substance can have in the same manner, united with a remarkable action on the nervous system. It remains to be seen whether extended observation will confirm these ideas. The dose might probably be much greater than what I used.

*Explanation of the Plate.*

The plate represents the stomach of a rabbit poisoned six or seven years ago by chloroform; *a* is the cardia, *b* the pylorus. It shows the irritation which the poison has produced, and the curious blackening occasioned by all the class to which chloroform belongs, and of which I have still better specimens.





